DRESS LIKE A STAR: RETRIEVING FASHION PRODUCTS FROM VIDEOS

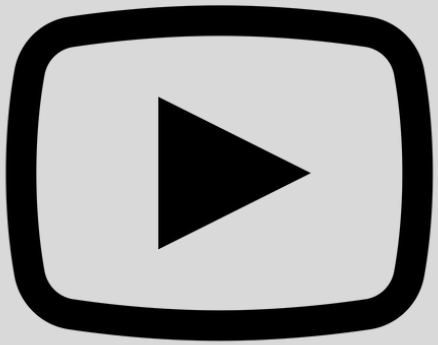
NOA GARCIA & GEORGE VOGIATZIS

COMPUTER VISION IN FASHION WORKSHOP

Fashion in Videos

Movies

TV shows



Online

Fashion in Videos

Sex and the City

Fashion in Videos

The Devil Wears Prada

Fashion in Videos

The Great Gastby

Fashion in Videos

Make fashion products in videos more accessible to users.

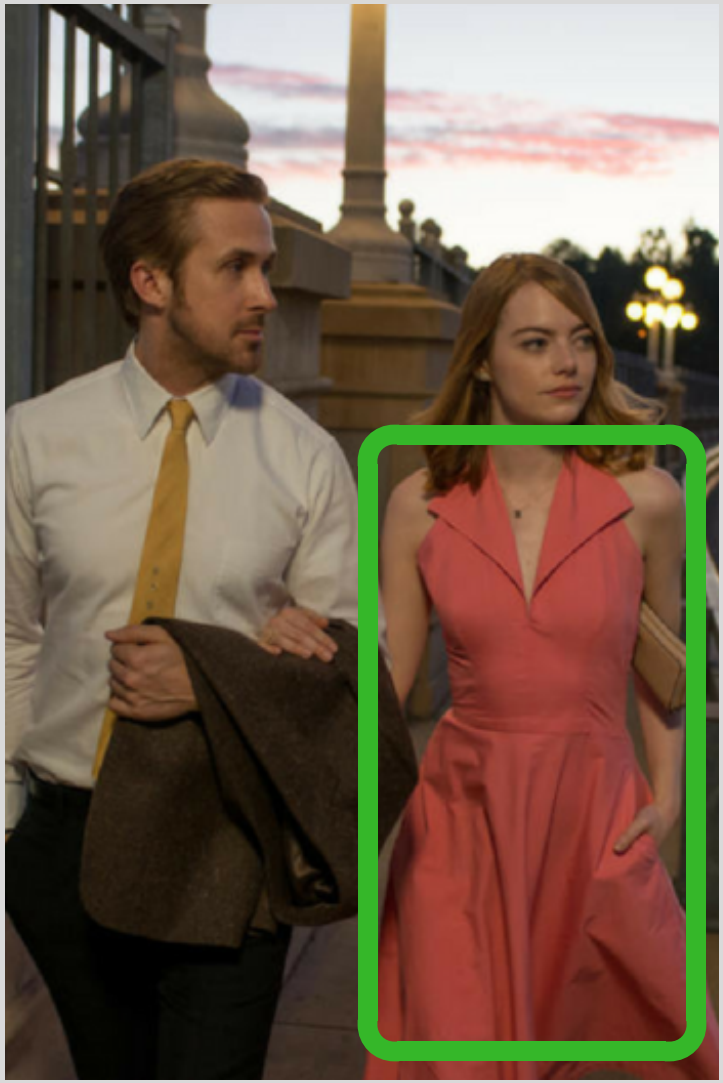
Fashion in Videos

Constraints

1. Camera view

Camera viewpoint cannot be moved to have a better view of the fashion object.

Constraints



2. User interaction

The creation of bounding boxes around the object of interest may distract users from the video.

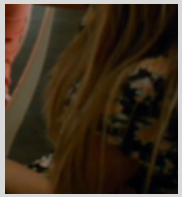
Constraints

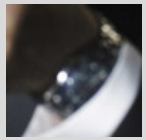
3. Small objects

Small, partially occluded and blurred.

Our Proposal

Instead of object recognition…





Our Proposal

Instead of object recognition… frame retrieval

Related Work

Clothing Retrieval

- Attribute classification [1]
- Domain adaptation [2]

Scene Retrieval

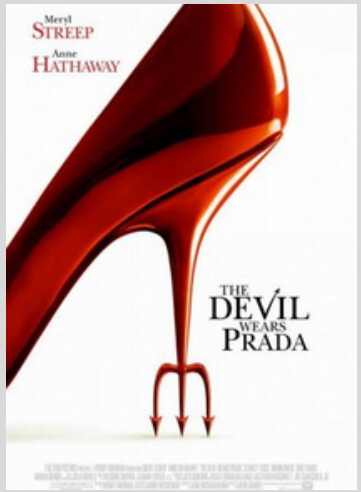
- Image Retrieval in Videos [3]
- Temporal tracking [4]
- Scene Descriptors [5, 6]

Our Approach: binary temporal tracking + fast indexing.

Challenges

- Average movie duration — 120 minutes
- Standard FPS rate — 24 fps
- Average frames per movie — 172,800 frames

With only 5 or 6 movies



More than a million frames!

Our System

Three main modules:

- Product indexing
- Training phase
- Query phase

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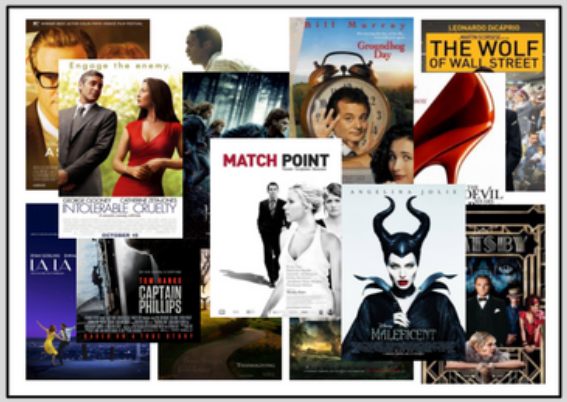
Our System: Product indexing

Product Indexing

Fashion Items



Video Collection

Indexed Database

Fashion items and frames related in an database.

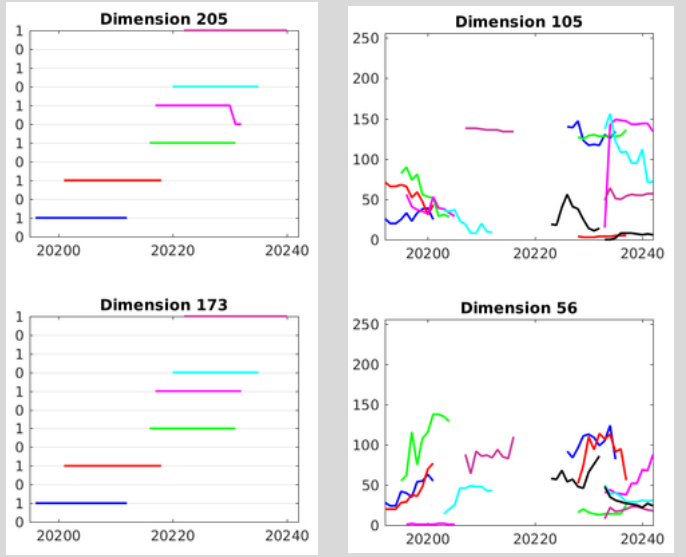
Our System

Three main modules:

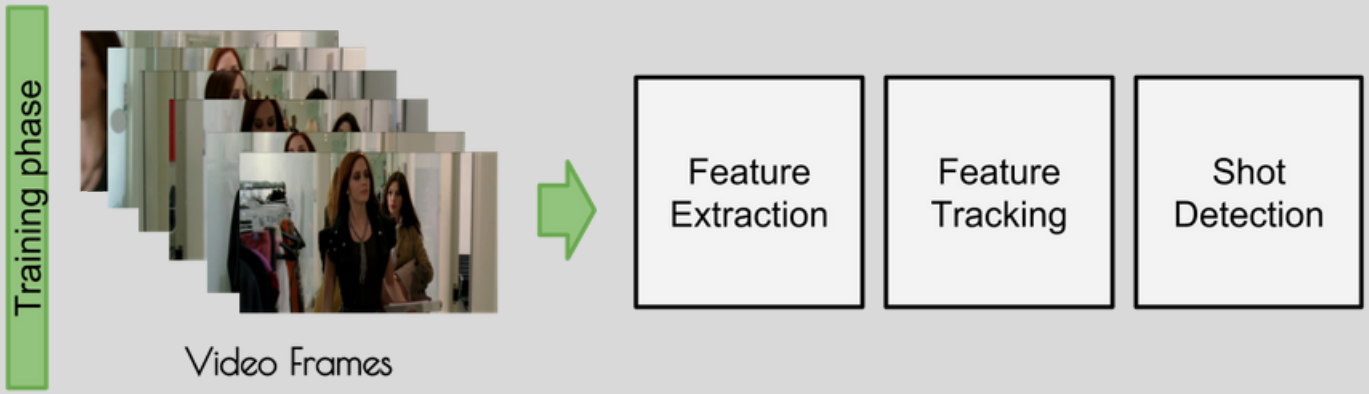
- Product indexing
- Training phase
- Query phase

Our System: Training phase

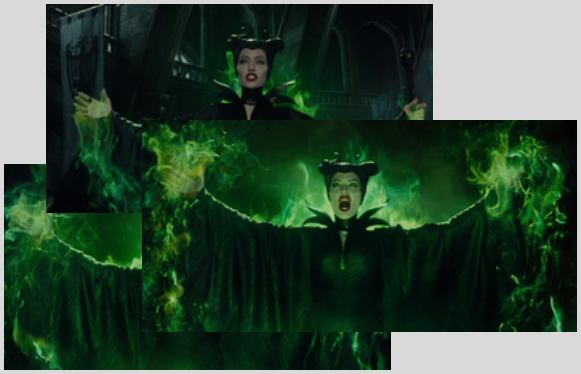
BRIEF features are more constant over time than SIFT or CNN.



Our System: Training phase



shot 1

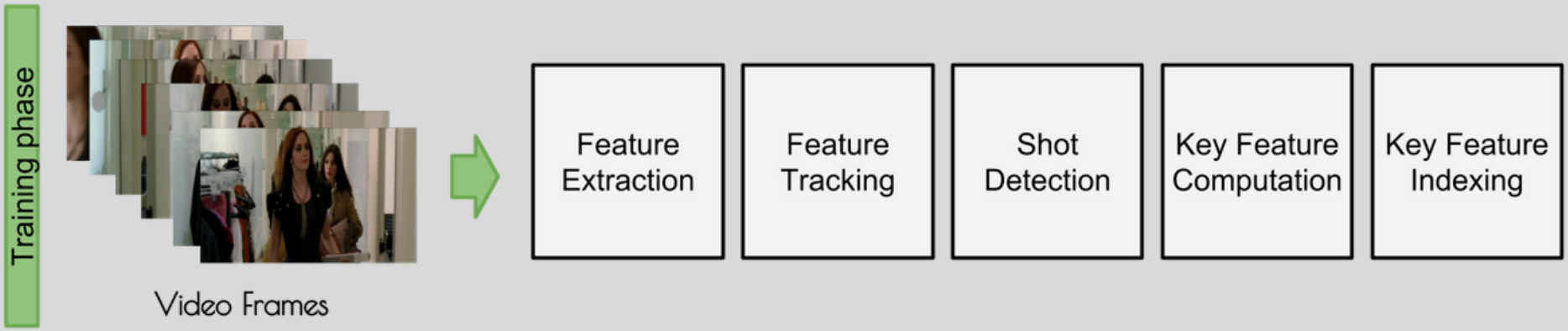


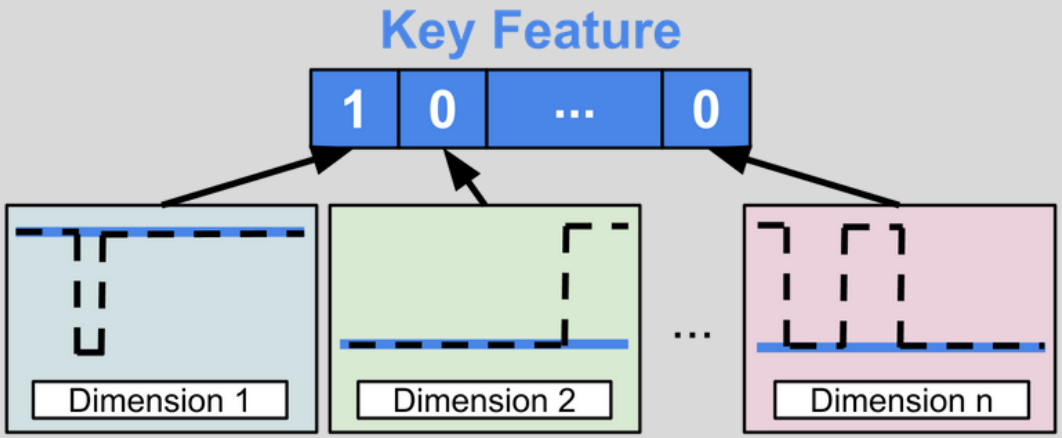
shot 2

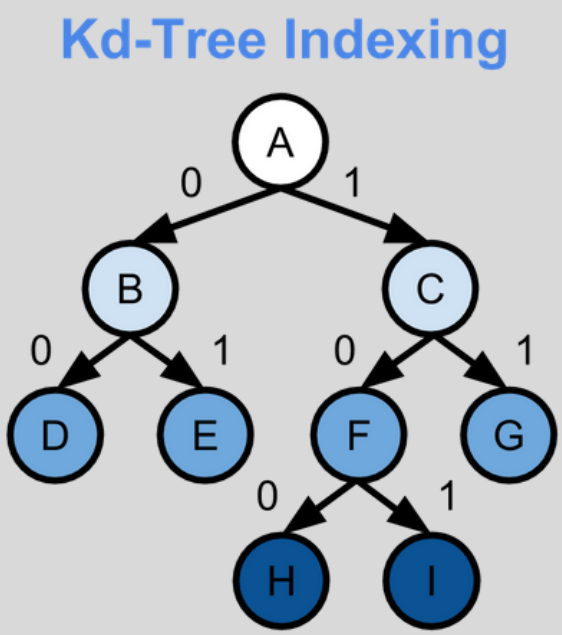
shot 3

Similar frames are grouped into shots.

Our System: Training phase







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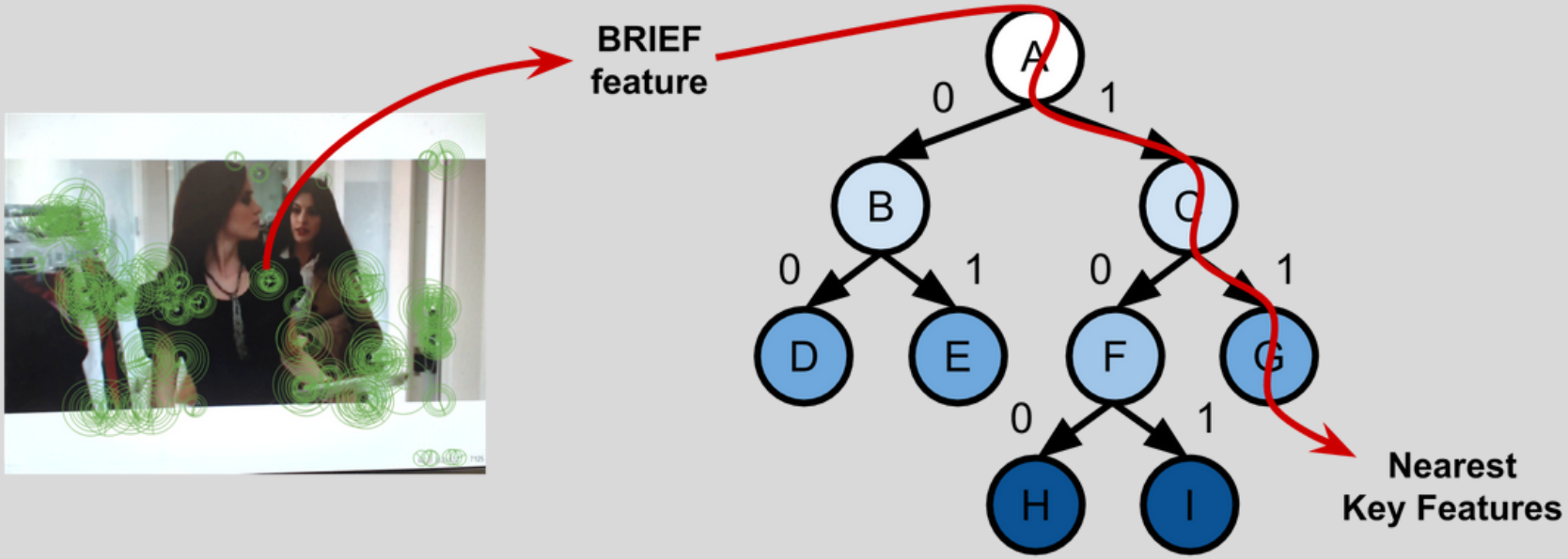
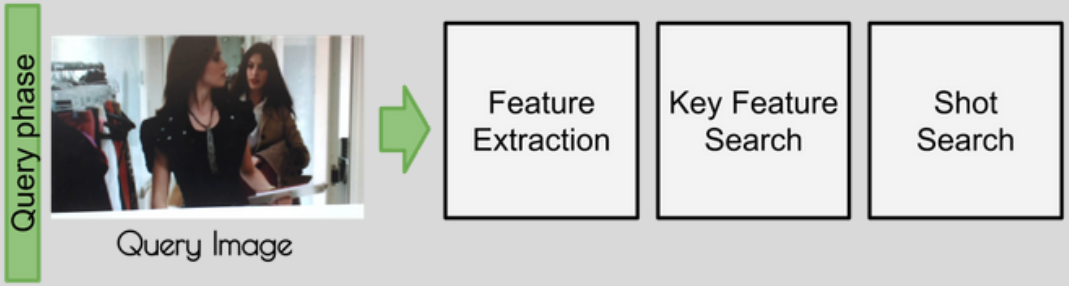
Our System: Query phase



Our System: Query phase



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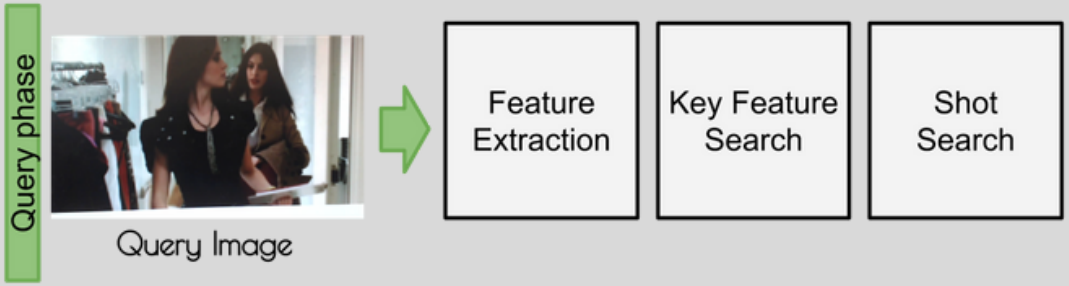

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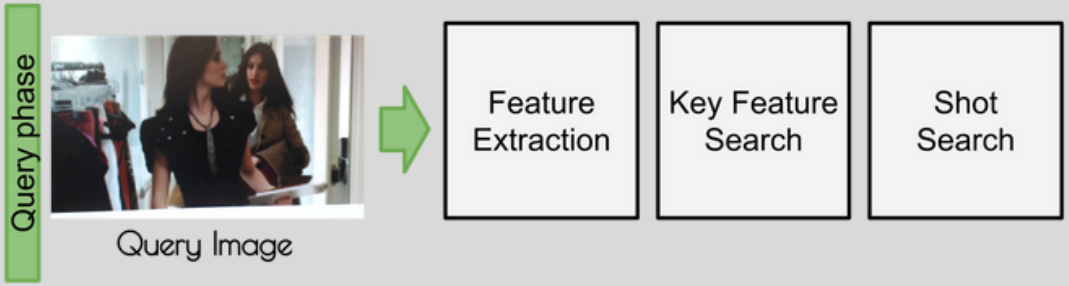

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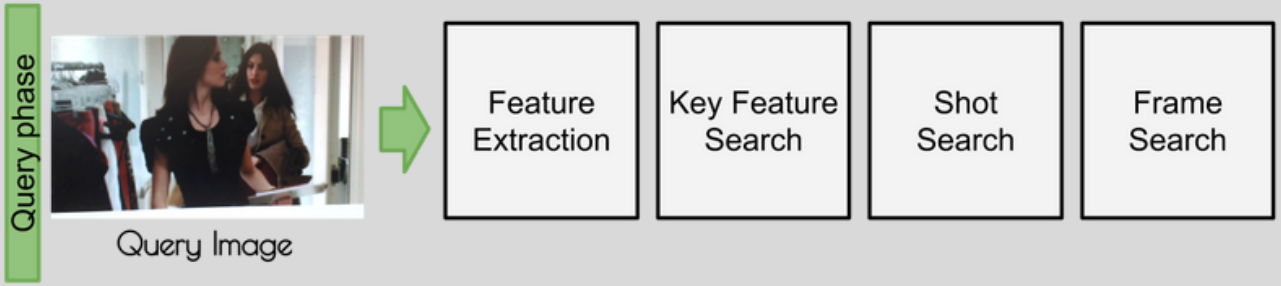

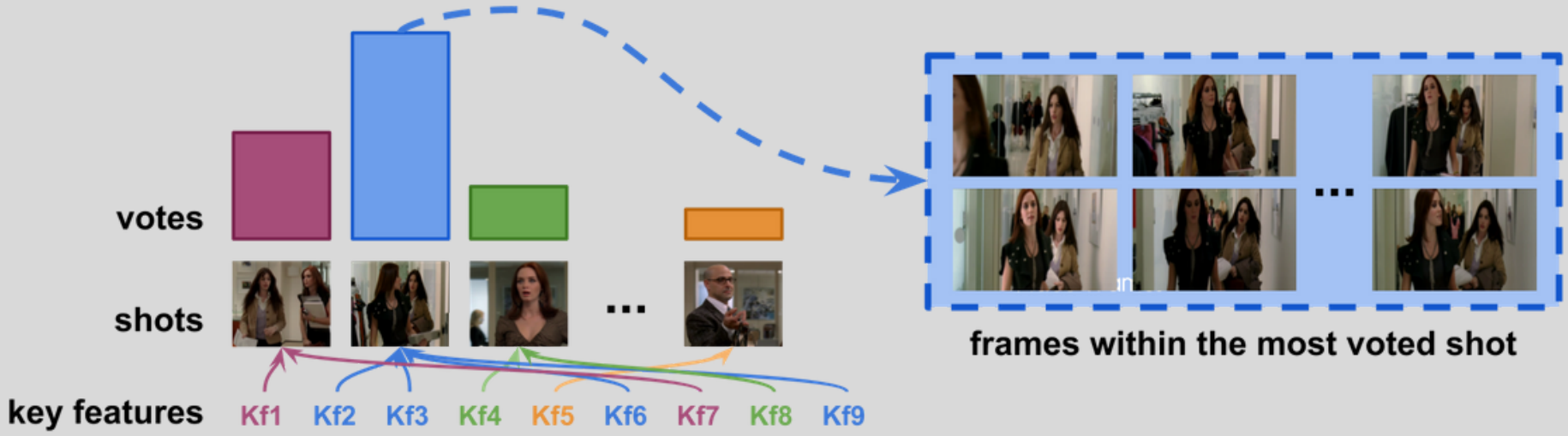

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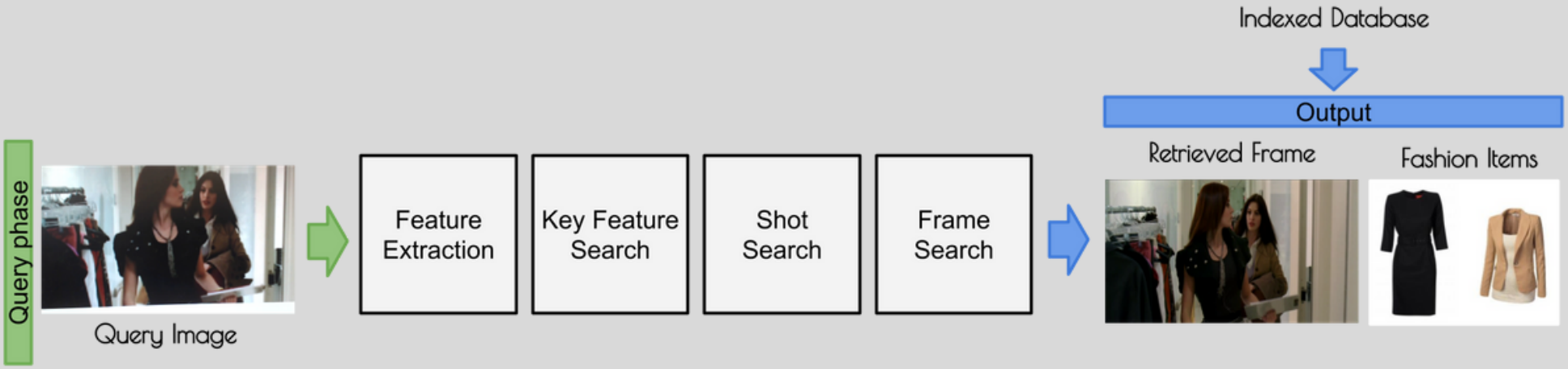
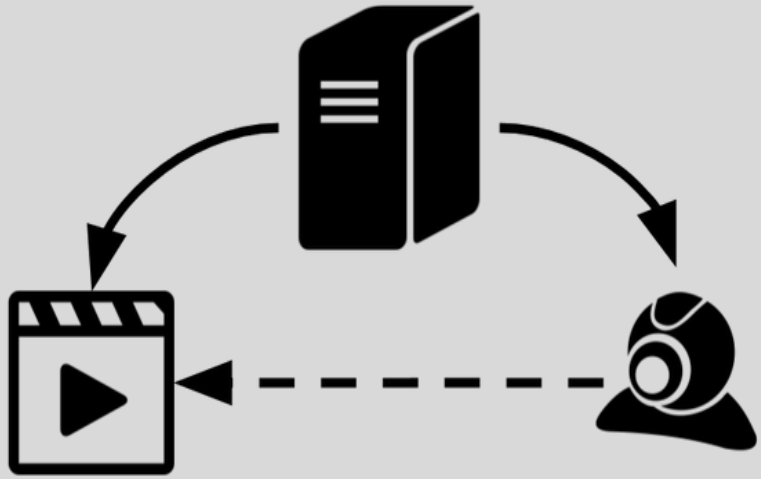


Use the most similar frame to find the fashion products in the indexed product database.

Experiments - Dataset

- Webcam captures video playback.
- Frame number is used as a ground truth.



The retrieved frame should be visually similar to the annotated ground truth.

Experiments - Retrieval Performance

Results using a single movie, 1h 49min duration

Huge gain in memory requierements with our method.

BF: Brute Force
KT: Kd-Tree
KF: Key Frame

		BF	KT	KF	Ours
Indexed Features		85M	85M	25M	2M
Memory		2.53GB	2.53GB	762MB	61MB
Accuracy	B = 10	0.98	0.90	0.91	0.92
	B = 50		0.94	0.92	0.93
	B = 100		0.96	0.93	0.94
	B = 250		0.97	0.93	0.94

Experiments - Scalability

40 movies

80 hours

7 millon frames

Experiments - Scalability

Results using 40 movies

Title	N. Frames	N. Features	N. Shots	N. Key Features	N. Queries	Accuracy
The Help	210387	101M	1726	2.2M	813	0.98
Intolerable Cruelty	179234	86M	1306	2M	544	0.97
Casablanca	147483	71M	881	1.5M	565	0.96
Witching & Bitching	163069	66M	4193	0.8M	588	0.74
Pirates of the Caribbean 3	241127	108M	3695	1.7M	881	0.74
Captain Phillips	190496	59M	7578	0.6M	618	0.67
Total	**7M**	**3040M**	**116307**	**58M**	**25142**	**0.87**

Data reduction:

From 3,040M features to 58M key features.

Conclusions

- System to perform video clothing retrieval.
- It helps users to find items shown in videos.
- Based on frame retrieval and fast indexing.
- It scales well when the collection is increased.

THANK YOU!

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References

[1] Z. Liu, P. Luo, S. Qiu, X. Wang, and X. Tang. Deepfashion: Powering robust clothes recognition and retrieval with rich annotations. In CVPR, 2016.

[2] S. Liu, Z. Song, G. Liu, C. Xu, H. Lu, and S. Yan. Street-to-shop: Cross-scenario clothing retrieval via parts alignment and auxiliary set. In CVPR, 2012.

[3] J. Sivic and A. Zisserman. Video Google: a text retrieval approach to object matching in videos. In ICCV, 2003.

[4] A. Anjulan and N. Canagarajah. Object based video retrieval with local region tracking. Signal Processing: Image Communication, 22(7), 2007.

[5] C.-Z. Zhu and S. Satoh. Large vocabulary quantization for searching instances from videos. In ACM ICMR, 2012.

[6] A. Araujo and B. Girod. Large-scale video retrieval using image queries. IEEE Transactions on Circuits and Systems for Video Technology, 2017.